Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Unlicensed Operation In the TV Broadcast Bands	)	ET Docket No. 04-186
	)	
	)	
Additional Spectrum for Unlicensed Devices Below 900 MHz and In the 3 GHz Band	)	ET Docket No. 02-380

Comments of
Thomas C. Smith

I am submitting these comments to voice my concerns to the proposed rulemaking concerning the unlicensed operation of low-power devices in the broadcast television band. The comments that I am voicing are solely mine and do not represent my employer or any other group that I am a member of. I am a broadcast TV technician with over 37 years of experience and have designed and installed many TV antennas and reception systems including complex master antenna systems. I am also familiar with broadcast and microwave interference issues having served as a Society of Broadcast Engineers Chapter Frequency Coordinator. I filed comments in April of 2003 when the first notice of ET Docket No. 02-308 was released objecting to the concept of unlicensed devices in the TV broadcast band and my views have changed little from that time.

I am concerned that the FCC is moving forward with this proposal mainly because of pressure from Congress and the Computer industry which is seeking to capture as much spectrum as possible to sell new devices. This concern arises for a number of reasons including interference issues that I have dealt with or have been made aware of. The other concern is that given human nature, once someone has been given a foot in the door, they will normally push to the limits allowed and many times beyond those limits. Pass experience as proven that when transmitting equipment is available to the general public, FCC rules are normally not followed, either by lack of knowledge, laziness or contempt of the rules. As the Commission has already declared that they will allow operation of some kind of devices in the TV bands, most likely unlicensed, after February 17, 2009, the best that I can hope for is that the Commissions limits this devices to as few as possible and that there is some method of identifying the users in order to track down sources of interference. The Commission's action to wait until after the DTV transition before allowing unlicensed or other non-broadcast devices on the

TV bands is complete was the correct action to take. It both gives time to determine the amount of spectrum that may or may not be available and time to develop truly workable systems.

Interference to TV Reception

Interference to TV reception and to Part 74 users is my main concern. Over the years I have seen examples of many kinds of interference to both TV reception and wireless mikes. Most of the interference to TV reception that I have seen has been either receiver overload due to the nearby transmission of two-way radio equipment such as from a passing police car or nearby two-way base station either from the antenna input or leakage into a set hooked to cable system. I have also seen leakage issues from nearby broadcast transmitters into sets hooked to cable. In my community, we have problems with both a VHF analog and a digital transmitter creating noise and interference issues and the local cable company had to move both VH1 and MTV up a couple of channels due to complaints about interference that can from an analog UHF transmitter replacing them with a couple of shopping networks. I experience the interference at my home and I am over 16 miles from the transmitters. There is a water tower a little less then a half mile up my street with antennas for an Internet provider operating in the 2.4 GHz band. I can image the potential problems with the operation of a 3-4 watt digital signal the near. That would be about the same as operating a 25 to 50 watt analog TV transmitter at that site. If these devices are used to provide Internet service, they will be located in many cases on towers near homes or even on the light pole on the corner.

Another interference issue that I have run into has been as an SBE frequency coordinator. Madison, WI is both a state Capitol and the home of a Big Ten University. On election nights and football Saturday's, I have requests for frequency coordination from out of town stations and networks for 2 GHz frequencies. I normally try to get them to use channels 8 and 9, which share the 2.4 GHz unlicensed band. Because of the interference from all the unlicensed devices in the band, which these units are licensed for and have the right to operate as visitors in our area, they usually ask for a frequency in 2 GHZ channels 1-7 which is difficult to give many times because of the demands of the local stations on the band for their coverage of events. To me this proves that there must be coordination between services sharing the bands and these operations must be similar and compatible with each other.

Finally, the last interference issue concerns wireless mikes. I believe wireless mikes have not been an issue with TV reception because they

operate with a narrow bandwidth and at very low powers. Also they operate in churches, theaters, arenas and other commercial buildings, which normally have steel and concrete construction and are some distance from homes and other locations with large numbers of TV's. But, I believe that for the same reasons that these potential unlicensed systems could create interference to TV's, they can create interference to wireless mikes. Besides licensed Part 74 users, there are wireless mikes in nearly every church, theater, college lecture hall, area and stadium in this nation. And most of these locations are also in prime areas to locate transmitters for a wireless Internet service. An example is outside the arena on the University of Wisconsin Campus. The City of Madison has a 2.4 GHz wireless network in the central part of the city. One of the transmitters is located across the street from the University's arena facing a glass walled concourse with many entrances into the arena itself. Besides basketball and hockey, there are one to two dozen concerts a year. A 3-4 watt transmitter would surely wipe out a 50-milliwatt mike located 300 to 400 feet away.

Control Methods and Spectrum Sensing

I have a real problem with many of the concepts of controlling interference to TV reception either by spectrum sensing or the use of GPS and databases. First of all I do not believe that any of these systems will work with consumer equipment, which would probably have the chance of causing interference problems more often. The reasons for consumer devices causing more problems is that because that units are inside, a GPS system will not operate because it is unable to see two or more satellites to find it's location and spectrum sensing would be difficult because of low signal levels due to walls, low antenna height and outside signal blocking from shadows from nearby building and terrain. And then there is the consumer, who may still have their VCR or other digital devices have a flashing 12:00 because they haven't figured out how to set the clock. And I know many people who have problems adjusting their indoor or outdoor antennas in areas within sight of the TV stations tower. For these reason, I believe that the FCC should not authorize low-power consumer devices in the TV band.

For the higher power units, spectrum sensing has a better chance of being able to work, as the monitoring antenna would be higher and closer to that of the normal TV receive antenna. The problem with spectrum sensing is trying to protect low power wireless mikes and setting parameters that would give some degree of protection to thus who are locate beyond the predicted Grade B of a station and have to out of necessity try to receive those signals as they are the only ones available. A spectrum sensing system will have to operate with very low signal levels across the TV bands, which may be difficult to do reliably. Also, there is the problem of terrain shadowing which will make the

system more complex as the system may have to rely on multiple units to talk to each other and do the spectrum sensing. This would also make it easier to modify the system in order to avoid problems for the operator and cause problems for the TV viewer. I believe the database/ GPS system has problems in several ways. They are need to keep database updated on a timely matter, complex computer system in device and its cost and human error or indifference if system requires outside management.

These systems can only work if there is some kind of regulatory back up such as licensing or registration. Broadcasters, cable companies and others need to know were these units are in order to find them when a problem occurs. The device used by the Internet provider customer should have is output frequency controls by the providers base stations in order to minimize interference.

Licensed vs. Unlicensed Operation

In this notice, the Commission asks if the devices should be licensed or unlicensed. Because they will be secondary to anything else on the band, full power TV stations, low power TV stations, TV translators and maybe even wireless mikes, it could appear the being unlicensed operation would be the correct option. But that raises two other issues. The first is how will you identify the transmitters and their owners, so that you can notify the operators of these transmitters that they are creating interference problems. The second issue is one of fairness. When one talks of a system using one watt transmitters with antenna gains of 6 dbi and the system using multiple transmitters is a mesh network, one is describing a business operation. When others have to pay for new spectrum in auctions to conduct business, is it fair to allow unlicensed operation where no fees are paid for spectrum use. The 2.4 GHz networks that are in operation in many cities are prime examples of use of spectrum for free at a time when others are forced to pay sometimes outrages amounts for spectrum.

As far as identifying the transmitters, I believe there needs to at least some registration or licensing system. The system needs to give the location, owner and contact information and possibly operating frequencies. The system should be automated on the Internet and be capable of providing an authorization code to activate the transmitter much like that used to activate software. The transmitters must also be capable of transmitting an ID that can be matched with a database created from the licensing information. The payment of a fee would not be out of line when registering a transmitter or system.

Public interest groups and small Internet providers have called for unlicensed use of the TV band in order to provide easy entry into and expansion of broadband services. I believe their main attitude is to avoid the cost and oversight of the licensing process. Also, many of these interest groups believe that the free enterprise system will take care of any excesses. Experience with the citizen band radio band when licensed and afterwards, the current situation with wireless mikes and pirate broadcast stations prove that the only way to prevent violations is by a strong oversight like licensing gives or having interference situations end in lawsuits. And the situation is not much better in the 2.4 GHz unlicensed band were aftermarket devices and instructions for modify equipment to increase signal range abound. I believe that many interest groups favor marketplace or other unlicensed solutions is because few of their policy makers are scientists or engineers. Going to a few of the policy groups websites that have commented on this issue, I found most of the members of the policy groups to be economists or political policy scientists with no one with a technical background.

The Next Step

I believe that the Commission needs to do a number of things before it can make any final rules on unlicensed devices in the TV broadcast Band. As I stated earlier, since the FCC has issued a timetable and a few rules, I doubt this rulemaking can be stopped. But it may still be too early to may any decisions on the outcome. One of the first things that needs to be decided is what the service to the public should these devices provide. In many of the proposed bills that have been offered in Congress, the catch phrase has been extending the reach of broadband to the American Public, mainly in rural areas. This may mean creating a new service using the same bands as broadcast TV to provide a new broadband service. Before many of us can accept any other service on the TV broadcast band, we need more information. The proposed rules have no information on possible bandwidth requirements, like will the transmissions remain in the same 6 MHz bandwidth as TV transmissions, what types of modulation will be allowed, how many frequency groups will be needed to avoid interference when operating mesh or cellular types of network and is there enough spectrum in many areas to support a mesh network or multiple systems.

There also is the question of future growth in broadcast television. Currently, in the era of consolidation, about the only way to get into TV is to buy a small station, which there are few of or apply for and build a station. Because of the DTV transition, the last applications were accepted about 10 years ago, which as put a small number of stations on over the past few years. And because of the freeze of applications within 100 miles of the top thirty markets in anticipation of the DTV rules and transition, it has been

longer then ten years in many markets where new stations could have been added. There is no doubt, a pent-up demand in many markets as they have new, growing or changing populations since the start of the DTV transition. These possible changes will have to be taken into account in determining the amount of available spectrum for possible broadband use. The possibility of increased duopolies in TV may also increase the demand for more TV stations. And finally because of the clarity of pictures in digital TV, low-power TV may become more viable as coverage will improve in areas were analog LPTV would start to provide noisy and nearly unusable signals.

One issue that needs to be dealt with is the soundness of creating a new business service when it is secondary to new TV stations, LPTV stations and TV translators, particularly when those going into them are not familiar with FCC allocation rules and things such as primary and secondary services.

Finally, the discussion concerning unlicensed or licensed devices in the TV broadcast Band is currently a battle between the TV broadcasters and the computer industry with each taking it particular side. I would like to suggest that as the Commission continues this proceeding, that a standards committee be formed, like the committee that set the DTV standard, to develop standards for these devices to coexist in the TV broadcast band. The committee should have representatives of the broadcast owners, its organizations such as the NAB, MSTV, SBE and consultants, representatives of the computer manufacturing industry, any Internet provider organizations and the IEEE. Currently, it looks as if the FCC is trying to write the standards by rulemaking and lobbying and also pressure from Congress. That method will leave everyone unsatisfied. A dialog between all parties must be created to solve all potential issues.

I would also like to see the FCC map out the coverage area of all full power, low power and translator TV stations to see exactly how much so called white area actually exists. It would also be helpful if the maps gave some indication of the possible amount of fringe viewing areas beyond the stations grade B.

Summary

The FCC is proposing new services that could well cripple an older established service that still provide much usefulness to many members of the American Public. With raising cable and satellite fees and the advent of multicasting, some households may even return to more frequent use of over the air TV. Lets not endanger one of America's few existing choices in TV services.

Finally, lets remember the reason for the Radio Act of 1927 and the Communications Act of 1934, It was because there was chaos in the airwaves because everyone was trying to operate on the same frequencies and had no one to control the system.

Respectfully submitted
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